

CLAIMS

We claim:

1. A component mounting apparatus comprising:

a pair of component supply sections for accommodating a plurality of components, the component supply sections being arranged on opposite sides of a board positioning section;

a first mounting head section comprising a rotary member adapted to be rotatively driven about a horizontal axis, a plurality of component suction nozzles attached to the rotary member along respective axes which each intersect the horizontal axis, and a recognition section opposed to the rotary member,

the first mounting head section being operable to perform successive suction operations in order to pick up the components with the plural component suction nozzles and to perform successive recognition operations of the components respectively sucked by the component suction nozzles by the recognition section upon intermittent

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rotation of the rotary member at one of the component supply sections,

and the first mounting head section being operable to successively mount the components respectively sucked by the component suction nozzles onto the board upon intermittent rotation of the rotary member at the board positioning section; and

a second mounting head section comprising a rotary member adapted to be rotatively driven about a horizontal axis, a plurality of component suction nozzles attached to the rotary member along respective axes which each intersect the horizontal axis, and a recognition section opposed to the rotary member,

the second mounting head section being operable to successive suction operations in order to pick up the components with the plural component suction nozzles and to perform successive recognition operations of the components respectively sucked by the component suction nozzles by the recognition section upon intermittent rotation of the

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rotary member at the other of the component supply sections,

and the second mounting head section being operable to successively mount the components respectively sucked by the component suction nozzles onto the board upon intermittent rotation of the rotary member at the board positioning section.

2. A component mounting apparatus according to claim 1, wherein each of the first and second mounting head sections comprises a plurality of nozzle rotation driving mechanisms for rotating the corresponding component suction nozzle around the respective axes with respect to the rotary member, and wherein each of the component suction nozzles of the first and second mounting head sections can be rotated around the axes thereof by the nozzle rotation driving mechanism in accordance with recognition results from the recognition section, thereby performing successive adjustment of postures of the components sucked by the component suction nozzles.

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3. A component mounting apparatus according to claim 1, wherein the rotary members of the first and second mounting head sections can be intermittently rotated at regular angular intervals at the component supply table, and wherein at an angular position of the rotary member where one of the component suction nozzles is opposed to the component of the component supply table, another one of the component suction nozzles is opposed to the recognition section.

4. A component mounting apparatus according to claim 1, wherein the rotary members of the first and second mounting head sections can be intermittently rotated at regular angular intervals at the component supply table, and wherein the component sucked by one of the component suction nozzle is opposed to the recognition section during the rotation of the rotary member.

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5. A component mounting apparatus according to claim 1, wherein each of the first and second mounting head sections further comprises an illuminator for illuminating the components sucked by the component suction nozzles when each of the components is opposed to the recognizing section.

6. A component mounting apparatus according to claim 1, wherein each of the first and second mounting head sections further comprises a head main body which includes the rotary member, a frame which supports the head main body and the recognition section, and an elevation mechanism for elevating the head main body with respect to the frame.

7. A component mounting apparatus according to claim 1, wherein each of the first and second mounting head sections comprises a head main body which includes the rotary member, a frame which supports the head main body and the recognition section, and an elevation mechanism for

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elevating the frame.

8. A component mounting apparatus according to claim 1, wherein the rotary members of the first and second mounting head sections are adapted to rotate at lower speed at the end of the rotation with respect to the speed at the start of the rotation.

9. A component mounting apparatus according to claim 1, wherein the first and second mounting head sections are independently movable between the component supply sections and the board positioning section, and wherein the first mounting head section can perform successive mounting of components onto the board positioned at the board positioning section while the second mounting head section performs successive component suction and recognition operation at the component supply section.

10. A component mounting apparatus according to claim 9,

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wherein one of the first and second mounting head sections is adapted to mount components at high speed, and the other of the first and second mounting head sections is adapted to mount components that require mounting with a high degree of precision.

11. A component mounting apparatus according to claim 1, wherein either the first or second mounting head section can be selectively operated in accordance with a type of the board positioned at the board positioning section, and wherein one of the first and second mounting head sections is adapted to mount larger components, and the other of the first and second mounting head sections is adapted to mount smaller components.

12. A component mounting apparatus according to claim 1, wherein the first or second mounting head section can perform suction of larger components after finishing suction of smaller components.

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13. A component mounting apparatus according to claim 1, wherein the first or second mounting head section can perform mount operations of smaller components after mounting larger components.

14. A component mounting apparatus comprising:

a pair of component supply sections for accommodating a plurality of components, the component supply sections being arranged on opposite sides of a board positioning section;

first and second mounting head sections, each of the first and second mounting head sections comprising a rotary member capable of being rotatively driven about a horizontal axis, a plurality of component suction nozzles attached to the rotary member along axes which each intersect the horizontal axis, and a plurality of nozzle rotating driving mechanisms for rotating the component suction nozzles respectively; and

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first and second recognition sections for recognizing each of the components sucked by the first and second mounting head sections,

wherein each of the first and second mounting head sections is operable to successively suck the components by the component suction nozzles upon rotation of the rotary member at one of the component supply sections, move to one of the first and second recognition sections to perform successive recognition of the components sucked by the component suction nozzles upon rotation of the rotary member, rotate the component suction nozzles about respective axes by the respective nozzle rotation driving mechanisms in accordance with recognition results from the recognizing section thereby performing successive adjustment of postures of the components sucked to the component suction nozzles, and successively mount the components sucked by the plural component suction nozzles onto the board upon rotation of the rotary member at the board positioning section.

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15. A component mounting apparatus according to claim 14, wherein the rotary members of the first and second mounting head sections are adapted to rotate at lower speed at the end of the rotation with respect to the speed at the start of the rotation.

16. A component mounting apparatus according to claim 14, wherein the first and second mounting head sections are independently movable between the component supply sections and the board positioning section, and wherein the first mounting head section can perform successive mounting of components onto the board at the board positioning section while the second mounting head section performs successive suction of the components at the component supply table and successive component recognition at the recognizing section.

17. A component mounting apparatus according to claim 16, wherein one of the first and second mounting head sections

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is adapted to mount components at high speed, and the other of the first and second mounting head sections is adapted to mount components that require mounting with a high degree of precision.

18. A component mounting apparatus according to claim 14, wherein either the first or second mounting head section can be selectively operated in accordance with a type of the board positioned at the board positioning section, and wherein one of the first and second mounting head sections is adapted to mount larger components, and the other of the first and second mounting head sections is adapted to mount smaller components.

19. A component mounting apparatus according to claim 14, wherein the first or second mounting head section performs suction operations of larger components after finishing suction of smaller components.

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20. A component mounting apparatus according to claim 14, wherein the first or second mounting head section performs mount operations of smaller components after mounting larger components.

21. A method of mounting components, the method comprising:

positioning a mounting head section with respect to a component supply section;

successively sucking components supplied from the component supply section by component suction nozzles attached to a rotary member of the mounting head section, wherein the component suction nozzles intersect a horizontal axis of the rotary member, and the components are sucked by rotating the rotary member about the horizontal axis;

recognizing the components sucked by the component suction nozzles by a recognition section, wherein the sucking and recognizing operations are performed

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simultaneously;

rotating the component suction nozzles around axes thereof with respect to the rotary member in accordance with recognition results from the recognizing section, thereby performing successive adjustment of postures of the components sucked by the component suction nozzles;

positioning the mounting head section with respect to a board; and

successively mounting the components sucked by respective component suction nozzles onto the board by intermittently rotating the rotary member of the mounting head section.

22. A method according to claim 21, wherein the mounting head section comprises a first and second mounting head sections, wherein the component supply section comprises a first and second component supply section respectively corresponding to the first and second mounting head sections; and wherein the method further comprises:

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halting the successive suction, recognition, adjustment, and mounting operations of the components by one of the first and second mounting head sections when one of the component supply sections corresponding to said one mounting head section needs to be replenished with components, while continuing the successive suction, recognition, adjustment, and mounting operations of the components by the other of the first and second mounting head sections;

detaching the one of the component supply sections to permit it to be replenished with components;

replenishing the one of the component supply sections with components;

reattaching the one of the component supply sections following the replenishment thereof; and

restarting the successive suction, recognition, adjustment, and mounting operations by the one of the first and second mounting head sections.

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23. A method of mounting components, the method comprising:

positioning a mounting head section with respect to a component supply section;

successively sucking components supplied from the component supply section by component suction nozzles attached to a rotary member of the mounting head section, wherein the suction component suction nozzles intersect a horizontal axis of the rotary member, and the components are sucked by rotating the rotary member around the horizontal axis successively;

recognizing the components sucked by the component suction nozzles by a recognition section, wherein the recognition operation are performed after the suction operation;

rotating the component suction nozzles around axes thereof with respect to the rotary member in accordance with recognition results from the recognizing section, thereby performing successive adjustment of postures of the

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components sucked by the component suction nozzles;

positioning the mounting head section with respect to a board; and

successively mounting the components sucked by respective component suction nozzles onto the board by intermittently rotating the rotary member of the mounting head section.

24. A method according to claim 23, wherein the mounting head section comprises a first and second mounting head sections, wherein the component supply section comprises a first and second component supply section respectively corresponding to the first and second mounting head sections; and wherein the method further comprises:

halting the successive suction, recognition, adjustment, and mounting operations of the components by one of the first and second mounting head sections when one of the component supply sections corresponding to said one mounting head section needs to be replenished with

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components, while continuing the successive suction, recognition, adjustment, and mounting operations of the components by the other of the first and second mounting head sections;

detaching the one of the component supply sections to permit it to be replenished with components;

replenishing the one of the component supply sections with components;

reattaching the one of the component supply sections following the replenishment thereof; and

restarting the successive suction, recognition, adjustment, and mounting operations by the one of the first and second mounting head sections.

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